

**PROPOSAL FOR
CONFIRMATORY SAMPLING NO FURTHER ACTION
ENVIRONMENTAL RESTORATION SITE, 186
OPERABLE UNIT 1302**

Prepared by
Sandia National Laboratories/New Mexico
Environmental Restoration Project
Albuquerque, New Mexico

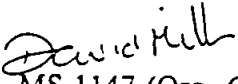
Prepared for the
U. S. Department of Energy

Sandia National Laboratories

Albuquerque, New Mexico 87185

date: September 17, 1996

to: Paul Aamodt, MS 1147 (Org. 6681)

from:  David Miller, MS 1147 (Org. 6682)

subject: Technical Area I (TA-I) No Further Action (NFA) Proposals.

Attached are four NFA Proposals that require signature approvals and distribution to the Department of Energy (DOE) for submittal to the New Mexico State Environment Department (NMED) and the Environmental Protection Agency (EPA). The NFA Proposals are for ER Project Sites #33, Motor Pool; #186, TCE Spill at Building 895; # 192, Waste Oil Tank; and #211, the Building 211 Underground Storage Tank.

These proposals have received internal review by management (Fran Nimick), regulatory (M.J. Davis), legal (Becky Krauss), and ecological risk (Yvonne McClellan). The draft proposals have also been reviewed by members of the DOE-KAO staff (John Gould and Mark Jackson). Therefore, internal signatures by management, legal, center, and V.P. approvals are necessary before transmittal to the DOE for distribution. It is my understanding that you are now serving as the point of contact for coordinating the signature approval process.

The attached copies should be considered "originals" from which the necessary copies can be made. Also attached are the file copies for the text and tables (Word and EXCEL files). If you have any questions regarding these documents please see me or call 284-2574. Thank you.

Copy to: w/o attachments

MS 1147 W. Cox (Org. 6681)
MS 1147 M.J. Davis (Org. 6681)
MS 1147 F. Nimick (Org. 6682)
MS 1147 M. Skelly (Org. 6682)
MS 1147 H. Fleck (Org. 6682)

Exceptional Service in the National Interest

PROPOSAL FOR CONFIRMATORY SAMPLING NO FURTHER ACTION
ENVIRONMENTAL RESTORATION SITE 186, BUILDING 859 TCE DISPOSAL

OPERABLE UNIT 1302

1. INTRODUCTION

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a No Further Action (NFA) decision for Environmental Restoration (ER) Site 186 based on confirmatory sampling (NFA Criterion 5; NMED et al. 1995).

1.1. ER Site Identification Number and Name

ER Site 186 (herein referred to as the site) is the Building 859 TCE Disposal, and is included in Operable Unit 1302.

1.2. SNL/NM NFA Process

The basis for proposing an NFA with confirmatory sampling is thoroughly described in Section 4.5.3 of the Draft *Program Implementation Plan (PIP) for Albuquerque Potential Release Sites* (SNL/NM 1994), and in Annex B of the *Environmental Restoration Document of Understanding* (NMED et al. 1995).

Briefly stated, if contaminant levels at the site do not exceed regulatory or risk-based criteria, the site can be proposed to the appropriate regulatory agency for NFA (NFA Criterion 5; NMED et al. 1995). As determined by the sampling activities described in this proposal, ER Site 186 has not released hazardous waste or constituents into the environment at concentration in excess of risk-based action levels.

1.3. Local Setting

The site is located on the east side of 11th Street between Buildings 859 and 855 near the center of TA-I (Figure 1; Appendix A). This site covers one-quarter acre and is located immediately south of where Building 859 now stands. The site is within the TA-I secured area and has limited access to workers with a security clearance or an escort.

2. HISTORY OF THE SWMU

2.1. Sources of Supporting Information

Information regarding the site can be found in the following pertinent documents:

- Interview notes contained in Kathy Gaither's May 10, 1991 field note book entry, pp. 18-19 (Gaither 1991a).
- *New ER Site #186 Near Building 859, SNL TA-I*. [Sandia National Laboratories memorandum to P. Davis, May 16, 1991] (Gaither 1991b).
- *Hazardous and Solid Waste Amendments Permit for Sandia National Laboratories, EPA I.D. No. NM 5890110518* (EPA 1993).
- *Program Implementation Plan for Albuquerque Potential Release Sites [DRAFT]* (SNL/NM 1994).
- *Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan* (SNL/NM 1995).

2.2. Previous Audits, Inspections, and Findings

This site was identified in 1991 as the result of an employee's response to a request in the Sandia Labs Weekly Bulletin for information concerning past practices that may have released hazardous materials.

2.3. Historical Operations.

From approximately 1973 to 1983, trichloroethene (TCE) was used to clean printed circuit boards in Temporary Buildings 1 through 6 (T 1-6), which were located close to where Building 859 now stands (Figure 1; Appendix A). During this time, it was common practice to discard the expended TCE on the ground outside T 1-6. A witness to the dumping estimated that up to 1 quart of TCE per day was discarded in this manner. The release predates Building 859 by at least 5 years (Gaither 1991b).

In the mid-1980s, Building 855 was constructed south of the temporary complex that contained T 1-6; no T-buildings were affected. In 1988, T 1-6 and the other temporary buildings were removed to construct Building 859. Earth-moving associated with the construction has considerably disturbed the site so that the present location of the T 1-6 TCE dumping site is obscured. Most of the area not covered by the Building 859 footprint is now covered by concrete walkways and loose landscape gravel. A witness to the TCE dumping believes that the place where the dumping occurred is now under a picnic table on a paved north-south trending walkway just south of Building 859 and just north of the more westerly of

two trees planted in the area. The witness was uncertain of the TCE dumping site's location because of the new layout of the area (Gaither 1991b).

3. EVALUATION OF RELEVANT EVIDENCE

3.1. Unit Characteristics

The conceptual model in the Work Plan identified the following potential contaminant of concern and release mechanism to soils: TCE was released directly to the surface soils and solutions may have evaporated or migrated to the subsurface. Subsequent earth moving conducted during Building 859 construction probably distributed the TCE throughout the soil, reducing the potential for a source because of enhanced natural degradation and volatilization.

3.2. Operating Practices

No written procedures for operating the site are known.

3.3. Presence or Absence of Visual Evidence

Field personnel conducting site visits and sampling activities in 1995 were unable to find any visual evidence of contaminated soils (borehole logs; Appendix B).

3.4. Results of Previous Sampling/Surveys

Prior to the RFI, no sampling or analysis of soil had been conducted at this site. No historical data were uncovered which related to the nature and extent of contamination. During the time between producing the initial draft of the Work Plan and conducting the field work for the RFI, a PETREX passive soil gas survey was conducted at the site. Excess soil gas samplers and analysis were available from another investigation at SNL/NM. The results of this "no-cost" survey were used to further determine the extent and nature of contamination at the site.

The PETREX soil gas collectors consist of activated charcoal adsorption elements in an inert atmosphere contained by a resealable glass tube. The opened collectors were installed 18 inches bgs and exposed for approximately 3 weeks. The sampler exposure time was determined to be 2 to 3 weeks by use of exposure time test samplers (time tests) at other SNL/NM locations (NERI 1994). The response values (analytical results) are reported in ion counts. Ion count values are the unit of measure for the relative

intensities associated with each of the reported compounds. For Site #186 the ion count values were not represented to an actual concentration of the reported compounds. Therefore, these values are best used as a semi-quantitative measure where a change in ion count value of an order of magnitude is considered significant for distinguishing potential hot spots from background areas (NERI 1994).

At the site, seven collectors were installed between Buildings 855 and 859 (Figure 2; Appendix A). The collectors were installed on April 27, 1994, using a bucket-style hand auger. After the collectors were placed, the holes were backfilled with native soils, flagged, and the locations measured from the corners of the buildings (IT Corp. 1994).

The collectors were removed on May 20, 1994, and sent to NERI's analytical laboratory for volatile organic compound (VOC) and semivolatile organic compound (SVOC) analyses (by thermal desorption-mass spectrometry or thermal desorption--gas chromatography/mass spectrometry). The analytical results for these seven samples showed background ion count values for all samples. No VOCs or SVOCs were detected above the PETREX normal reporting limits (IT Corp. 1994).

3.5. Assessment of Gaps in Information

The PETREX sampling was for vapor phase contamination; no sampling or analysis of soil had been conducted at this site. The RFI sampling strategy (Appendix C) was designed to fully characterize the site.

3.6. Confirmatory Sampling

3.6.1. Sampling Strategy

The RFI sampling and analysis plan for the site is provided in Appendix C. The RFI field sampling for the site started on June 26, and was finished on July 6, 1995. Sampling activity at the site was divided into two phases. Phase 1 was conducted from June 26 to June 30, 1995, and consisted of collecting soil gas samples at 19 locations for VOC analysis. Samples were delivered to the Environmental Restoration Field Office (ERFO) onsite laboratory with confirmatory samples sent to an offsite laboratory. Phase 2 was conducted on July 5 and 6, 1995, and consisted of soil sampling for VOC analysis at 5 of the original 19 soil gas sampling locations. The selection of these locations was based on the soil gas results. These soil samples were delivered to the ERFO onsite laboratory with confirmatory samples sent to an offsite laboratory. A total of 46 soil gas samples and 32 soil samples were collected.

Sampling equipment included a truck-mounted Geoprobe and associated supplies and tools, active soil gas sampling equipment, stainless-steel bowls and hand scoops, nitrile gloves, work gloves, and decontamination equipment (long-handled brush, soft brush, plastic containers, and ultra-pure nitrogen in pressurized bottle). Sampling equipment, such as the Geoprobe sampler and stainless-steel bowls, was decontaminated between each sample location and sample depth.

All sample locations at the site were first field-screened for possible radioactive contamination using a micro-R-meter. Only background radiation levels were encountered. A photoionization detector (PID) was used to screen for TCE at all sampling locations, in the breathing zone, on collected soil, and on soil gas. No TCE was detected by the PID. Prior to sampling, the PID (with an 11.5 eV lamp) was recalibrated using a 100 parts per million (ppm) TCE standard to read TCE directly (response factor of 2). The PID was then rechecked on a daily basis. See the borehole logs (Appendix B) for documentation of PID readings. The soil gas monitoring logs are discussed below.

Soil gas samples were collected from 19 different locations and soil samples were collected at 5 of the 19 soil gas locations (Figure 3; Appendix A). In accordance with the strategy specified in the Work Plan, locations were sampled on a grid pattern between Buildings 859 and 855 based on the probable location of the TCE release.

For phase 1 sampling, a Geoprobe was used to collect soil gas samples from 19 locations (designated GP001 through GP019). Samples were collected with a soil gas sampling tip at 10 and 20 ft bgs. The soil gas sampling method consisted of driving a Geoprobe to the desired depth and attaching a tube to the downhole probe. A vacuum pump was then used to draw soil gas at a specified rate into a 500-ml glass vial. While the glass vial was being filled, a PID was used to detect any TCE in the soil gas. The glass vials were sent to the ERFO onsite laboratory for analysis. Stainless steel SUMMATM canisters were used to collect soil gas for shipment to the offsite laboratory.

For phase 2, soil samples were collected with the Geoprobe from 0 to 2 ft, 3 to 5 ft, 8 to 10 ft, 13 to 15 ft, and 18 to 20 ft bgs. Phase 2 Geoprobe sampling consisted of using hydraulic-driven probes to collect relatively undisturbed soil in acetate sleeves encased in 3-ft long stainless steel probes. The acetate sleeves were then removed and cut into appropriate sample lengths, capped and taped, and sent either to the onsite or offsite laboratory for VOC analysis. For both sampling phases, one VOC sample was sent to the offsite laboratory for every five VOC samples sent to the ERFO onsite laboratory.

The site soils were very uniform and consisted of fine sand to silty sand, with varying proportions of medium sand to coarse sand and fine gravel. The lithology of the coarse fraction consisted of limestone, granite, and various metamorphic rock types. Soil color (by Munsell^R rock-color chart) varied from moderate yellowish brown (10 YR 5/4) and grayish orange (10 YR 7/4) near the surface to light brown (5 YR 6/4 and 5 YR 5/6) at 3 to 5 ft bgs. The soils continued to be light brown (5 YR 6/4 and 5 YR 5/6) to the total depth of the boreholes (20 ft bgs). Borehole logs are provided in Appendix B.

Soil gas and soil samples were collected for onsite and offsite VOC analysis. The soil samples were collected as an undisturbed sample in one 150-ml acetate sleeve. The sleeve ends were sealed with Teflon tape and end caps, labeled with pertinent information, sealed with custody tape, placed in a Ziplock bag, and immediately placed in coolers with blue ice. The soil gas samples for onsite analysis were collected in a 500-ml glass vial, labeled with pertinent information, placed in protective bubble wrap bags, and immediately placed in coolers with blue ice. The soil gas samples for offsite analysis were collected in stainless-steel SUMMATM canisters, labeled with pertinent information, and sealed with custody tape. The SUMMATM canisters were kept at ambient temperatures and overpacked in cardboard containers for shipment.

Samples were brought to the SNL/NM Sample Management Office (SMO) on a daily basis. SMO personnel cross-checked the information on the sample labels against the information on the COC form and refrigerated the soil samples at 4° C. Samples were then shipped by overnight delivery for analyses.

Soil gas and soil samples were hand carried to the ERFO laboratory for analysis. The soil gas analysis was completed a few days after sample collection and the data were used to help guide the placement of soil sampling locations.

The field team located the sampling points by measuring distances from known points, such as building corners. Location information was then provided to the SNL/NM ER Project's Geographic Information System (GIS) database. A table of survey data, including north and east coordinates generated by ER GIS, is presented in Table 1 (Appendix D).

QA/QC samples collected at the site include field duplicates, field blanks, rinsate blanks, and trip blanks. Field duplicates, field blanks, and rinsate blanks were collected at a rate of 5 percent of the number of environmental samples sent for offsite analysis. One each of a duplicate sample, field blank sample,

matrix spike (MS) and matrix spike duplicates (MSD), and rinsate blank sample were collected for this RFI. A trip blank accompanied the offsite shipment of VOC soil samples.

The VOC duplicate sample was collected by using two acetate sleeves in the thin-walled sampler. The sampler collected soil samples immediately adjacent (beneath) one another. The rinsate sample was collected by passing deionized water over decontaminated equipment. The field blank was a glass jar filled with clean soil that was exposed to the atmosphere in the vicinity of the work area. The trip blanks were sealed jars of clean soil or water that were placed in sample coolers sent to the laboratories. SMO supplied both the field blank and trip blank soils and jars. The offsite laboratory supplied the aqueous trip blanks.

All offsite analytical sample information was handled by the SMO after the field team relinquished custody of the samples. When the samples were shipped to the analytical laboratory, the SMO entered sample information into a database and tracked the status of the analytical results. When data became available, the SMO received the results with a summary data report and laboratory QC sample results.

The SMO reviewed the data summary reports and field collection documentation for completeness and accuracy, as required by SNL/NM TOP94-03. SMO personnel performed level 1 and 2 data validations (DV1/DV2) on all packages received from the laboratory. DV1 included reviewing the data package completeness, making sure that all requested analyses were performed and that all reports were signed by laboratory managers. DV2 included reviewing holding times and laboratory QC samples (method blanks, surrogate recovery samples, MS/MSDs, and laboratory control samples), comparing reported detection limits to contract required detection limits, and making sure the case narrative was correct and complete. The SMO was responsible for submitting all parts of the data packages to the Environmental Operations Record Center. This submittal included the original field collection and custody documentation, the laboratory data report and DV1/DV2 review documentation. Also, the analytical laboratories submitted analytical data in an electronic format for loading into the ER data management system (ERDMS). All geochemical analytical data tables in this report were generated by the ERDMS. Onsite soil gas and soil data was managed by the ERFO laboratory.

3.6.2. Analytical Results

All soil samples sent to an offsite laboratory were analyzed for VOCs using U.S. Environmental Protection Agency (EPA) method 8240. The ERFO onsite laboratory used mass spectrometry to analyze for VOCs.

3.6.2.1. Soil Vapor VOC Analysis

As required by FOP 94-21, "Shallow Soil Gas Sampling", soil gas was monitored in the field at all sample locations and depths. A PID calibrated to TCE was used to monitor the gases collected with the vacuum pump system. The concentrations were recorded on soil gas monitoring logs (Appendix E) and showed all PID readings were at background levels.

VOC analyses were performed on a total of 46 samples from two depths (10 and 20 ft bgs). Of the 38 samples collected and sent to the ERFO laboratory, 8 samples had detectable concentrations of TCE (Table 2; Appendix D), ranging in concentration from 2.8 (J) to 15.1 (B) parts per billion by volume (ppbv). All TCE values had "B" and/or "J" qualifiers (B and J qualifiers are defined in foot notes to the tables), and were from locations SVS001 through SVS006 in the western part of the site (Figure 3; Appendix A). No other VOCs were detected in the samples analyzed by the ERFO laboratory.

The eight samples sent offsite all had detectable concentrations of 16 different species of VOCs. The majority (>70%) of the values had "B" and/or "J" qualifiers (Table 3; Appendix D). Of note, 1,1,1-trichloroethane was found in all 8 samples ranging from .30 (B, J) to .51 (B, J) ppbv. TCE was found in all samples at values ranging from 0.77 (J) to 9.25 ppbv. The only other analyte without B or J qualifier detected consistently was trichlorotrifluoroethane [also known as FREON 113 (Lewis 1992)] at concentrations ranging up to 188 ppbv, with three samples qualified with an "E" denoting the value exceeded the calibration range.

The concentrations of TCE determined by the ERFO laboratory and the offsite laboratory do not always compare favorably. Of the eight samples collected at the same location and depth, five were reported as nondetect by ERFO laboratory but had low-level concentrations reported by the offsite laboratory (up to 2.92 ppbv). The three ERFO laboratory samples with greater concentrations of TCE compared favorably to the offsite laboratory results with 5.6 and 5.69 ppbv at SVS004-020, 2.8 and 2.98 ppbv at SVS006-020, and 5.4 and 9.25 ppbv at SVS005-020.

3.6.2.2. Soil VOC Analysis

The ERFO laboratory and the offsite laboratory performed VOC analysis on a total of 32 samples from five depths (2, 5, 10, 15, and 20 ft bgs). The 25 samples sent to the ERFO laboratory were all nondetects except for acetone found in 8 samples (Table 4; Appendix D). All the acetone concentrations had "J" qualifiers with a maximum of 9.5 parts per billion (ppb) found at GP005-002. The seven samples sent to the offsite laboratory were all nondetects except for methylene chloride found in two samples (Table 5; Appendix D), with concentrations of 2.1 (B,J) and 2.0 (B,J) found at GP001-020 and GP003-015, respectively.

3.6.2.3. Sample Blanks and Duplicates

The laboratory reported all nondetects for the VOC analyses of trip blank TB001, field blank FB001, and equipment blank EB001 (Table 5; Appendix D). Trip blank TB002 had acetone and methylene chloride detections, most likely attributable to laboratory contamination. A set of duplicate samples were collected at the 20 ft depth at location GP004, and sent offsite for VOC analysis. All results from the duplicate set were nondetect.

3.7. Risk Analysis

The purpose of this section is to provide a preliminary ecological evaluation for the potential contaminants of concern associated with Site 186. Site 186, the Building 859 TCE Disposal, is located on the east side of 11th Street between Buildings 859 and 855 near the center of TA-I, a secured area with limited access. TA-I is a major industrial area for SNL/NM with few open areas for wildlife or ecological species to habitat. This site is one-quarter acre in size and located immediately south of where Building 859 was constructed.

Field personnel conducting site visits and sampling activities in 1995 did not find any visual evidence of contaminated soils. The soil samples that were taken from this site did not show VOC contamination. A site visit was performed to determine if any species were located at this site. No burrowing animals or nesting of any species were found. This is a very small area with high human traffic and would be an unlikely place for ecological species to inhabit because of the lack of available food source.

Due to the lack of contamination at this site, no further ecological evaluation will be performed. The site does not present a danger to ecological species and should be considered for no further action.

3.8. Rationale for Pursuing a Confirmatory Sampling NFA Decision

3.8.1. Evaluation of Concentrations

The low-level TCE concentrations in soil gas detected by the laboratories appear to be legitimate occurrences. However, the detected TCE concentrations seen in these samples (with a maximum concentration of 15.1 ppbv) are several orders of magnitude less than the Proposed Subpart S action level for soils (60,000 ppb) or air (600 ppb). The Proposed Subpart S action levels for 1,1,1-trichloroethane are less restrictive than those for TCE. There are no available action levels for trichlorotrifluoroethane; however, it is not a confirmed or suspected carcinogen, and is described as being only "mildly toxic by ingestion and inhalation" (Lewis 1992).

To provide additional perspective on the soil gas VOC concentrations, these concentrations can be compared to concentrations at other ER sites. At the Chemical Waste Landfill (CWL) the VOC soil gas plume boundary was defined (with regulatory concurrence) using 100,000 ppbv total VOCs as the acceptable lower limit (SNL/NM 1992). At ER Site 186 the maximum total VOC concentration was approximately 125 ppbv. This concentration is three orders of magnitude less than the minimum required contaminant concentration to be considered within the plume at the CWL.

It is interesting to note that there were no TCE-degradation products such as dichloroethene or vinyl chloride detected in the soil gas samples. For a release to the environment that occurred over twenty years ago, one would expect to see some natural degradation of TCE.

Given the conceptual model proposed in the Work Plan, the distribution of VOCs in soil gas is problematic for the following reasons: 1) The former T 1-6 building was on the eastern edge of the site (Figure 1; Appendix A) whereas the highest soil gas concentrations of TCE were found on the western portion of the site. It is unlikely that lab workers would exit the building and walk over 100 ft away before dumping a beaker-full of solvent; i.e. we would expect to see higher TCE concentrations closer to the former T 1-6 building. In fact, there were no VOCs in the soil gas in the eastern portion of the site. 2) The locations with the highest soil gas concentrations are in an area that wasn't affected by the construction of Building 859. SNL/NM engineering drawing # 100811/A2 (dated 3/1/88) shows the concrete walkways north of Building 855 and west of Building 855 and 859 existed prior to the construction of Building 859. On this drawing it is stated that there was not to be any grading disturbance within 10 ft of the existing sidewalks on the west and south sides of the site. Therefore, the

four locations with the overall highest VOC concentrations (SVS001, -002, -003, and -005; Figure 3) were not disturbed during construction. Because the western portion of the site was not disturbed during construction activities, it is not possible for contaminated soils from the eastern part of the site to have been transported to these locations by grading or other activities associated with the removal of former Building T 1-6 or the construction of Building 859.

Although the soil gas survey had detectable concentrations of 16 species of VOCs, the data show that all the soil samples collected at the site are free of VOCs. This discrepancy has been verified at other locations at SNL/NM where it has been determined that the dominant transport mechanism in the unsaturated zone is transport in the vapor phase (SNL/NM 1992). The acetone and methylene chloride concentrations seen in the samples analyzed by both the onsite and offsite laboratories most likely represent laboratory contamination. Both of these VOCs are common lab contaminants and are not contaminants of concern at this site. Therefore, due to the minimal concentrations of VOCs in the soil gas and the absence of VOCs in the soils, VOCs are no longer considered to be contaminants of concern at the site.

3.8.2. Data Summary and Recommendations

The site has been sufficiently characterized by soil gas sampling at 19 locations (over an area measuring 125 ft by 175 ft) with samples collected at two depths down to 20 ft bgs, and by soil sampling at 5 locations to 20 ft bgs. The soil sampling data show that the site soils do not contain contaminants of concern, whereas the site soil gas contains enigmatic concentrations and distribution of minor amounts of VOCs.

A revised conceptual model of the site considers that the TCE released to the ground surface outside of the former building T 1-6 must have evaporated shortly after being deposited. No TCE-contaminated soil vapors exist in the eastern portion of the site. Possible low levels of gas phase VOCs in the western part of the site are not associated with the surface releases that were reported for the eastern part of the site. With an abundance of utility lines running north-south along the western boundary of the site (including water, communications, sanitary sewer, storm drain, etc.), fugitive vapor-phase VOCs may be migrating along high permeability pipe-chases from one or multiple unknown locations upgradient (vapor gradient) of the site. The low-level and widespread nature of the VOC concentrations may reflect a "baseline" concentration associated with the industrial setting of TA-I over the last fifty years. The

long list of VOCs detected in the offsite laboratory soil gas data, most of which were not reported as contaminants of concern at the site, support the contention of fugitive emissions of baseline VOC concentrations in TA-I soil gas.

An NFA is recommended for this site, based on the following:

- No significant VOCs were detected in the soil samples by the onsite and offsite laboratories.
- The TCE concentrations detected in the soil gas by the onsite and offsite laboratories are at extremely low levels when compared to Proposed Subpart-S action levels for soils.
- No visibly contaminated soils were described in the borehole logs.
- No concentrations of VOCs were detected during field screening using a PID calibrated to TCE.
- No VOC concentrations indicative of contamination were detected during the passive soil gas survey.

Based on the data collected during this RFI sampling program, it is evident that ER Site 186 has not released hazardous waste or constituents into the environment above action levels. Therefore, further investigations and/or VCMs are not warranted. Upon acceptance of the NFA proposal, the site will be removed from the list of ER Sites in the Hazardous and Solid Waste Amendments module of the RCRA Part B Permit (EPA 1992).

4. CONCLUSION

Based upon the evidence cited above, no potential remains for a release of hazardous waste (including hazardous constituents) which may pose a threat to human health or the environment. Therefore, ER Site 186 is recommended for an NFA determination.

5. REFERENCES

5.1. ER Site References

Gaither, K. 1991a. Interview notes regarding ER Site #186, contained in Gaither's field note book pages 18-19. May 10, 1991.

Gaither, K. 1991b. New ER Site #186 Near Building 859, SNL TA-I. Sandia National Laboratories memorandum to P. Davis, May 16, 1991.

- IT Corp., 1994. Field and Laboratory Documentation for TA-I Soil-Vapor Survey. Lener Report from Thomas Woodard (IT Corp.) to David Miller (SNL/NM, Department 7582), July 8, 1994.
- Kottenstette, R. J. 1995. SNL/NM (Department 7584) Memo to David Miller (SNL/NM Department 7582). Subject: 8260 Analytical Results for Soil Samples from TA-I Site 186. August 7, 1995.
- Lewis, P. 1995. SNL/NM (Department 7584) Memo to David Miller (SNL/NM Department 7582). Subject: 8260 Analytical Results for Soil Vapor Samples from TA-I Site 186. July 20, 1995.
- Lewis, R. J., Sr. 1992. *Sax's Dangerous Properties of Industrial Materials, Eighth Edition*. Van Nostrand Reinhold, New York.
- NERI, 1994. Northeast Research Institute. Draft Report on the PETREX Soil Gas Survey Conducted by IT Corporation at Technical Area II, Sandia National Laboratories, located in Albuquerque. New Mexico. NERI, Lakewood, Colorado. January 4, 1994.
- SNL/NM (Sandia National Laboratories, New Mexico), 1995 *Technical Area I (ADS 1302) RCRA Facility Investigation Work Plan*. Environmental Restoration Program, Sandia National Laboratories, U.S. Department of Energy, Albuquerque Operations Office, February 1995. [Includes: Interview notes and records of telephone conversations with current and retired SNL/NM employees (Employees 1 through 51). Communication made from February through June, 1993, as part of ER Program background investigation of TA-I ER Sites. SNL/NM Environmental Operations Record Center maintains these personal communication notes as a controlled document.]

5.2. Reference Documents

- EPA (U.S. Environmental Protection Agency), 1992. Module IV of RCRA Permit No. NM 5890110518, EPA Region VI, U.S. Environmental Protection Agency. Issued to Sandia National Laboratories, Albuquerque, New Mexico, September 1992.
- NMED (New Mexico Environment Department), U.S. Environmental Protection Agency, U.S. Department of Energy, Los Alamos National Laboratory, and Sandia National Laboratories--New Mexico, 1995. *Environmental Restoration Document of Understanding*. November 16, 1995.
- SNL/NM (Sandia National Laboratories, New Mexico), 1992. Chemical Waste Landfill Closure Plan and Post Closure Permit Application. Environmental Restoration Program, Sandia National Laboratories, U.S. Department of Energy, Albuquerque Operations Office. December 1992.
- SNL/NM (Sandia National Laboratories, New Mexico), 1994. *Program Implementation Plan for Albuquerque Potential Release Sites [DRAFT]*. Environmental Restoration Program, Sandia National Laboratories, U.S. Department of Energy, Albuquerque Operations Office, September 1993.

5.3. Aerial Photographs

No specific aerial photographs were used to support this NFA.

APPENDICES

- Appendix A ER Site 186 Figures
 - Appendix B RFI Sampling Borehole Logs
 - Appendix C Section 5.6 of the TA-I RFI Work Plan (SNL/NM 1995)
 - Appendix D ER Site 186 Tables
 - Appendix E RFI Soil Gas Monitoring Logs
-

APPENDIX A

ER SITE 186 FIGURES

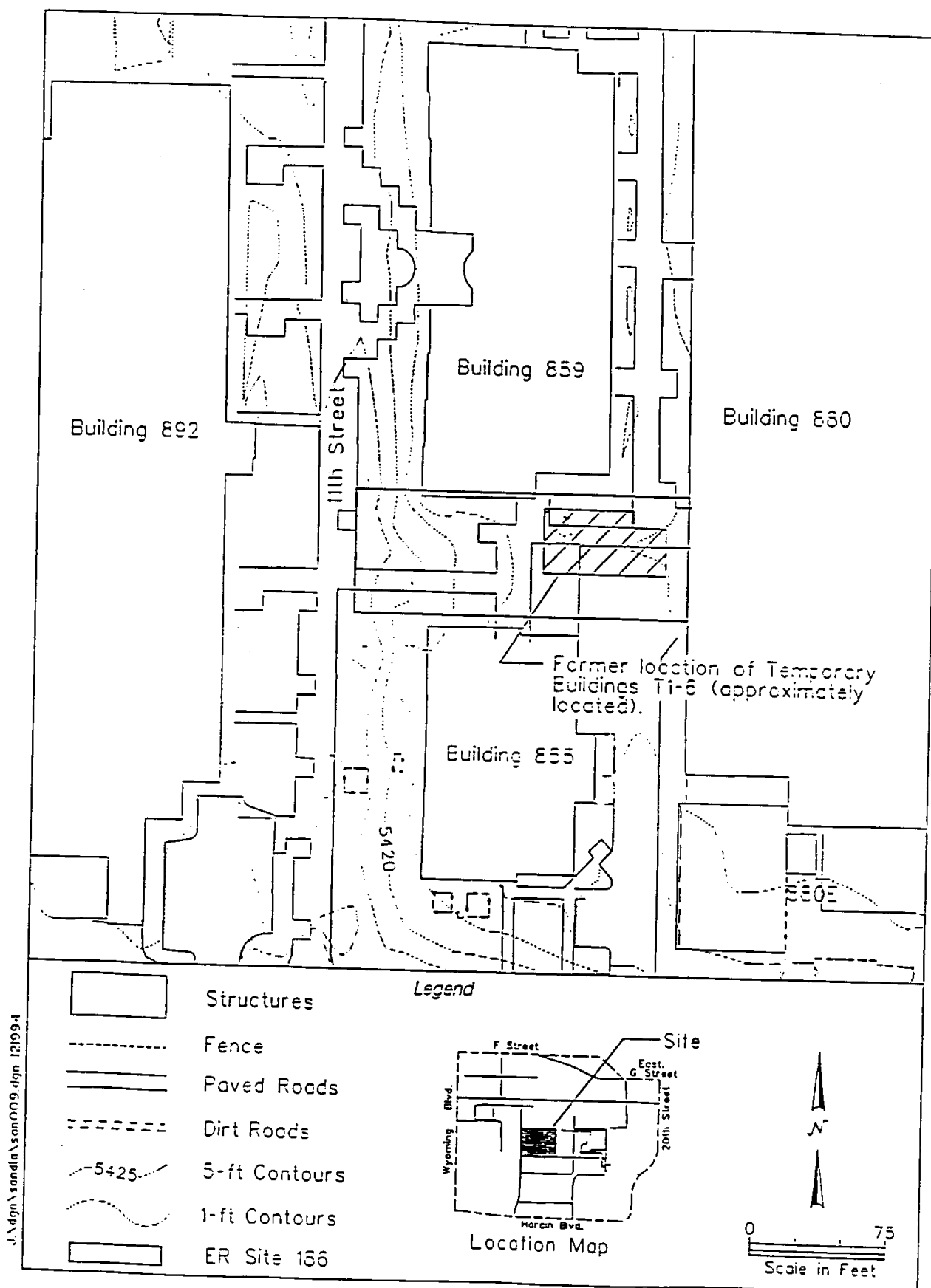


Figure 1
ER Site 186: Building 859 TCE Disposal

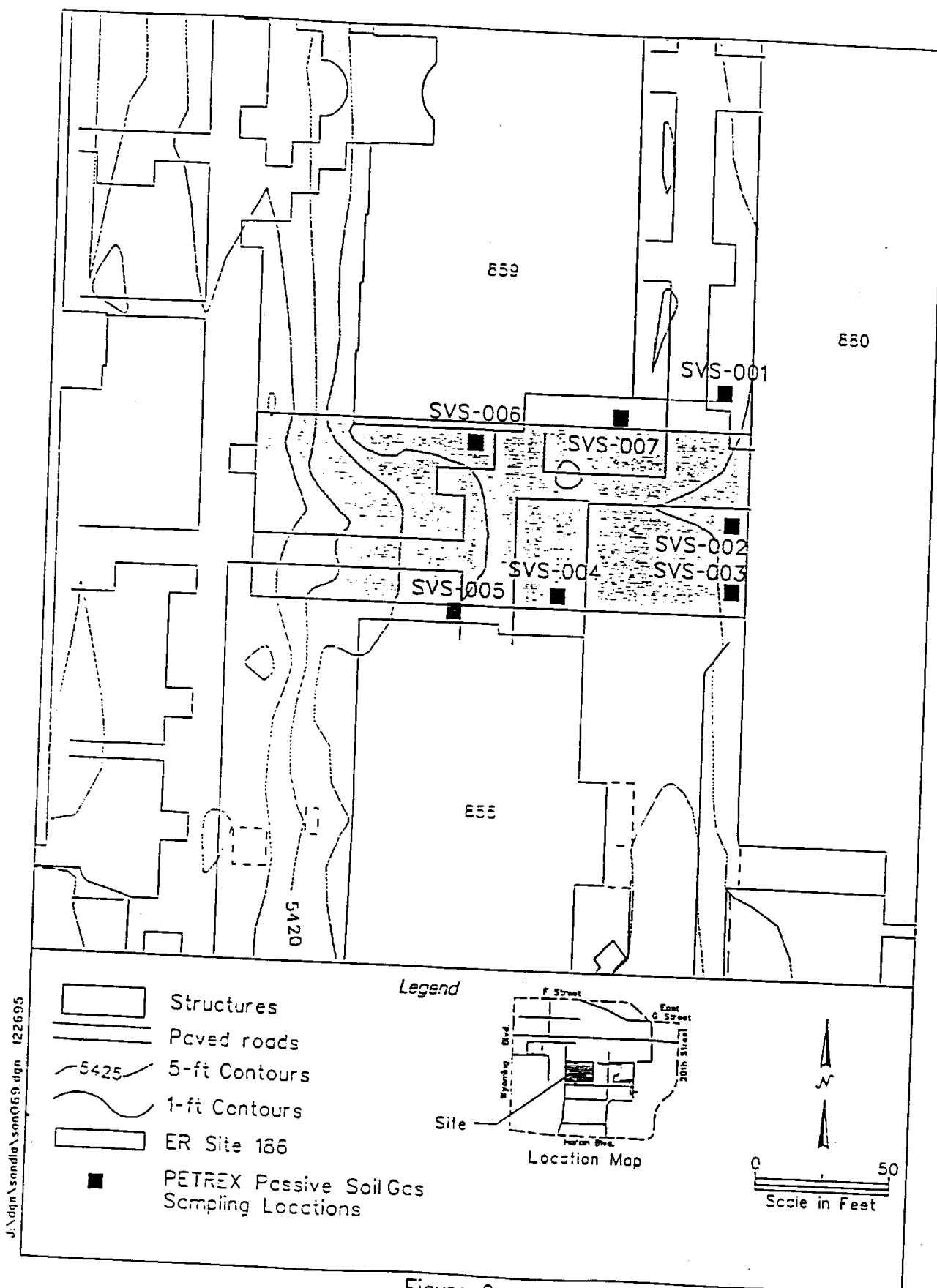
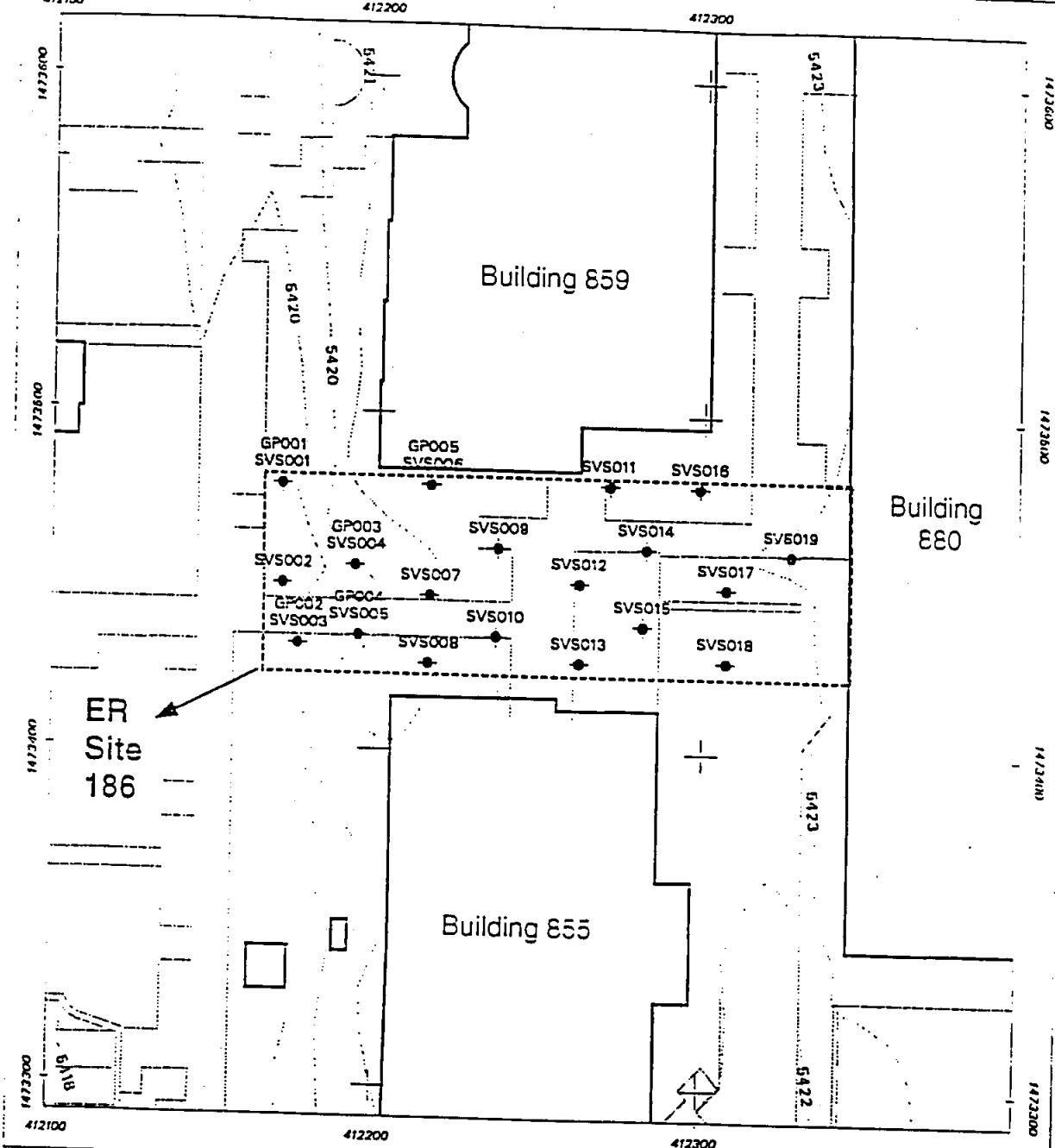


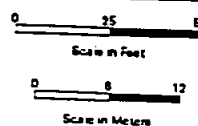
Figure 2
ER Site 186: PETREX Passive Soil Gas Sampling Locations



Legend

- Geoprobe Soil Gas Sample
Locations (SVS) and Soil
Sample Locations (GP)
- One Foot Contours
- Roadways (all types)
- Buildings
- ER Site 186

**Figure 3
ER Site 186
Geoprobe Soil and Soil
Gas Sampling Locations**



APPENDIX B

RFI SAMPLING BOREHOLE LOGS

VISUAL CLASSIFICATION OF SOILS

TAOU: TA-1 / ADS 1302		SITE NUMBER: ER site 186	
BORING NUMBER: T1186-BH001		COORDINATES: N.W. corner	DATE: 7/5/95
ELEVATION: ~ 5.420 DS		GWL: Depth N/A	DATE STARTED: 7/5/95
ENGINEER/GEOLOGIST: G. Stapes		Depth	DATE COMPLETED: 7/5/95
DRILLING METHODS: Geoprobe		PAGE: 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO.	RIOWSON SAMPLE ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	LITHOLOGY	REMARKS
5		N/A	50-55	~ 20 silty sand (SM) by change 10/12 7/4 0-4.5' 1st then 5/2 6/4 4.5' - 11.5' loose dry to 5 gally moist, 60% f. sand 30% clay. 10% coarse sand / 1 grain	SM		All p.i.o Readings = 15 kg
10							
15							
20							
				T.O. = 20'			

NOTES: No TCE detected.

VISUAL CLASSIFICATION OF SOILS

TA/OU: TA-1 / ADS 1302	SITE NUMBER: ER Site 186	DATE: 7/2/95
BORING NUMBER: T1186-54002	COORDINATES: N SW corner	DATE STARTED: 7/2/95
ELEVATION: ~ 5,420' ASL	GWL: Depth N/A	DATE COMPLETED: 7/2/95
ENGINEER/GEOLOGIST: G. Stappes	Depth	PAGE: 1 OF 1
DRILLING METHODS: GeoProbe		

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	LITHOLOGY	REMARKS
5		N/A	90-100	0-2.5' silty sand (SM) by on max 10yr 3/4 c-s @ 5' It has 5% silty, loose, org. 60% fine sand 30% fines 10% coarse sand 1% gravel.	SM		all pin readings = 8kg.
10				2.5-13' sand (SP) natural and 100% 3/4. loose, org. 30% fine sand 10% fines 10% gravel.	SP		
15				13-20' silty sand (SM) 1-bow 5% silty 10% coarse 0-55'	SM		
20				T.O. = 20'			

NOTES: NO odor or staining evident. NO TCE detected.

VISUAL CLASSIFICATION OF SOILS

TA/OU: TA-1 / ADS 1302	SITE NUMBER: ER site 186	DATE: 7/2/95
BORING NUMBER: T1186-BH003	COORDINATES: SUS 004	DATE STARTED: 7/2/95
ELEVATION: ~ 5.420 D.W.	GWL: Depth 11/4	DATE COMPLETED: 7/2/95
ENGINEER/GEOLOGIST: G. Stapes	Depth	DATE COMPLETED: 7/2/95
DRILLING METHODS: Geoprobe		PAGE: 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWSON SAMPLER ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	LITHOLOGY	REMARKS
0-20		N/A	70-100	0-20 silt silty sandy sm/sp see Log for GPOD. Except no SP layer 5.5-13', bitum @ 19-14.5'	SP sn		AL Pin Readings = 8.5
20-22				T.O. = 20'			
				no odor present no stain present.			

NOTES: NO TCE Detected. No odor or stain evident.

VISUAL CLASSIFICATION OF SOILS

TA/OU: TA-1 / ADS 1302		SITE NUMBER: ER site 186	
BORING NUMBER: 11186-BH004		COORDINATES: 505005	DATE: 7/17/95
ELEVATION: ~ 5.420 AS		GWL: Depth N/A Date/Time	DATE STARTED: 7/17/95
ENGINEER/GEOLOGIST: G. Stappes		Depth Date/Time	DATE COMPLETED: 7/17/95
DRILLING METHODS: Geoprobe			PAGE: 1 OF 1

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWSON SAMPLE ()	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	LITHOLOGY	REMARKS
5		N/A	70-100	0-2 Sand (SP) & silty sand (SM) muddy, yellow 10% silt, hard packed to loose, dry 60% fine sand, 30% fines 10% coarse sand & gravel	SP/SM		All pins Penetration = 6K
10				2-5 Silty Sand (SM) g. change to 2 3/4 6-6' to brown 5% silt, loose, dry, 60% fine sand 30% fines, 10% medium sand & gravel 6-12 silty 1/2 brown SYR 5/L			
15							
20							
				- T.O. = 20'			

NOTES: NO odor OR stain evident. NO TCE detected.

VISUAL CLASSIFICATION OF SOILS

TAOU: TA-1 / ADS 1302	SITE NUMBER: ER Site 186
BORING NUMBER: 71186-BH005	COORDINATES: SUS COG
ELEVATION: ~ 5.420	DATE: 7/7/95
ENGINEER/GEOLOGIST: G. Staples	DATE STARTED: 7/7/95
DRILLING METHODS: Geoprobe	DATE COMPLETED: 7/5/95
PAGE: 1 OF 1	

DEPTH (FT)	SAMPLE TYPE & NO.	THROWS ON SAMPLE (IN)	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	LITHOLOGY	REMARKS
0-10'		N/A	30-10	Sand (SP) & Silty Sand (SM) see GPCOH	SM/SP		ALL P10 Readings = 13/25
10-14.5'				Sand (SP) med yellow 10/25 - see descrip (G-PCOH)	SP		
14.5-20'				S.P. Sand (SM) H.S.M. Silty clay, coarse, med to bluish gray, 60% of Sand 30% fines 10% coarse Sand	SM		
				7.0% = 20'			

NOTES: no color or stain evident. NO TCE detected.

APPENDIX C

SECTION 5.6 OF THE TA-I RFI WORK PLAN (SNL/NM 1995)

5.6 ER Site 186, Building 859 TCE Disposal

5.6.1 Site Description and History

ER Site 186 is located on the east side of 11th Street between Buildings 859 and 855 near the center of TA-I. This site was identified in 1991 as the result of an employee's response to a request in the *Sandia Labs Weekly Bulletin* for information concerning past practices that may have released hazardous materials. This site covers one-quarter acre and is located immediately south of where Building 859 now stands. The release predates Building 859 by at least 5 years (Gaither 1991b).

From approximately 1973 to 1983, TCE was used to clean printed circuit boards in Temporary Buildings 1 through 6 (T 1-6), which were located close to where Building 859 now stands (Figure 5-21). During this time, it was common practice to discard the expended TCE on the ground outside T 1-6. A witness to the dumping estimated that up to a quart of TCE/day was discarded in this manner. In addition, small amounts (unknown volume) of isopropyl alcohol were discarded in a similar manner (Gaither 1991b).

In the mid-1980s, Building 855 was constructed south of the temporary complex that contained T 1-6; no T-buildings were affected. In 1988, T 1-6 and the other temporary buildings were removed to construct Building 859. Earth-moving associated with the construction has considerably disturbed the site so that the present location of the T 1-6 TCE dumping site is obscured. Most of the area not covered by the Building 859 footprint is now covered by concrete walkways and loose landscape gravel. A witness to the TCE dumping believes that the place where the dumping occurred is now under a picnic table on a paved walkway just south of Building 859 and just north of the more westerly of two trees planted in the area. The witness was uncertain of the TCE dumping site's location because of the new layout of the area (Gaither 1991b).

5.6.2 Previous Investigations

To date, no sampling or analysis has been conducted at this site.

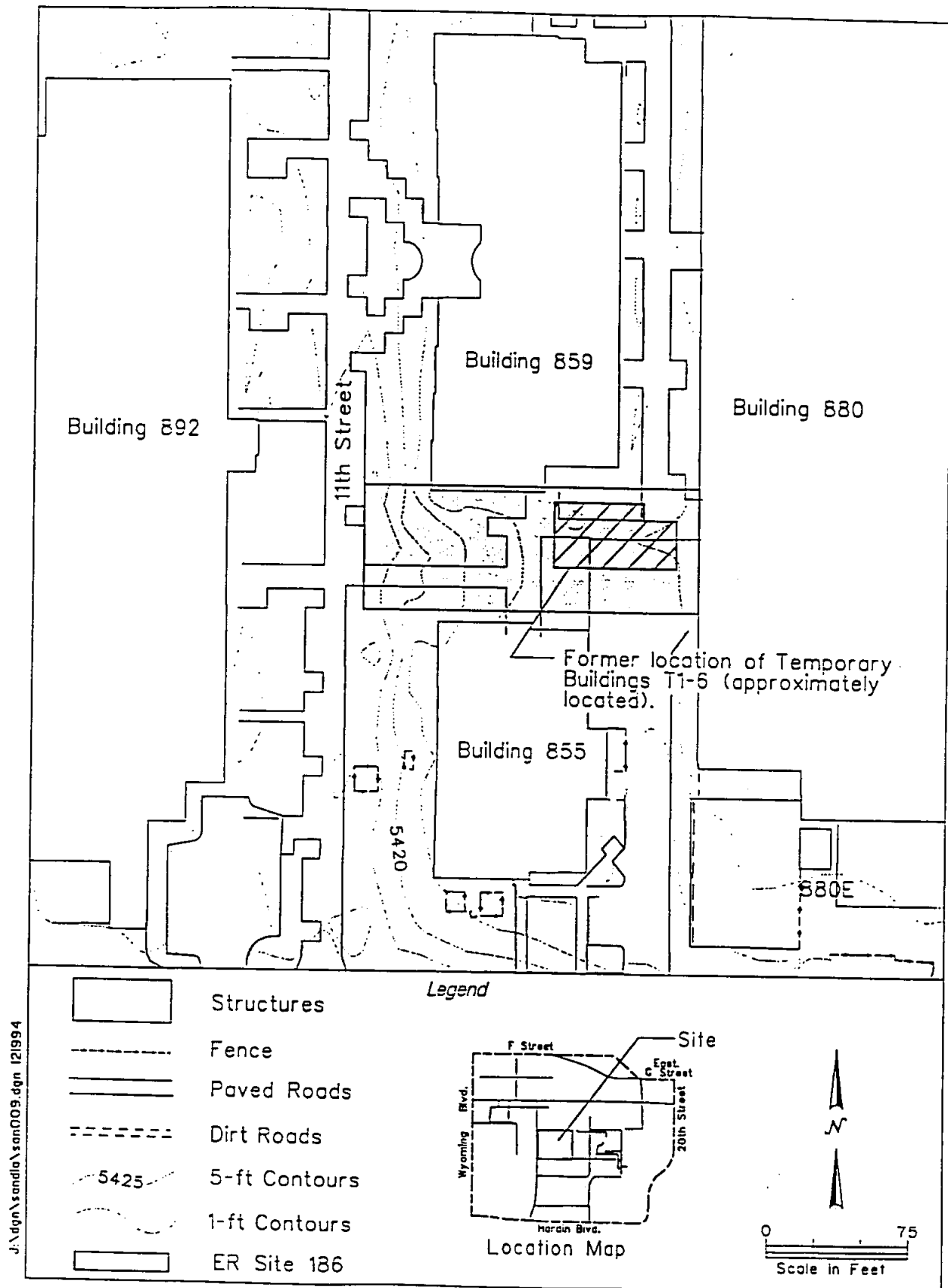


Figure 5-21
ER Site 186: Building 859 TCE Disposal

5.6.3 Nature and Extent of Contamination

No historical data were located that related to the nature and extent of contamination.

5.6.4 Conceptual Model

The conceptual model for the TCE release at ER Site 186 is based on available historical information. Before the construction of Building 859, any release of TCE would have been directly to the soil. The primary contaminant source is TCE, although it is possible that other unknown waste was disposed of in a similar manner. There is no information available that further describes other activities in T 1-6.

Assuming 1 quart (0.25 gal) of TCE was released a day, for 240 working days/year for 10 years, a total volume of 600 gal of TCE may have been released at the site. Given the small volume of TCE solution released daily, it seems likely that a large portion of these 600 gal has evaporated. The earth-moving conducted during Building 859 construction probably distributed the TCE through the soil enough to further reduce the potential for a source because of enhancement of natural degradation and volatilization. Another effect that construction had on contamination is the capping of area soil with concrete walkways and building foundations. This prevents volatilization and rain infiltration from mobilizing the TCE through the vadose zone.

The mobility and persistence of TCE in the environment is well known (ATSDR 1988; Kloepper *et al.* 1985; Wilson and Wilson 1985; Cline and Viste 1985; Barrio-Lage *et al.* 1986). The dominant process for removing TCE from shallow soil and surface water is volatilization into the atmosphere. TCE is considered to have a medium mobility through soil and tends to move in an aqueous phase. However, information gathered at other SNL/NM sites indicates that chlorinated solvents may show significant migration in the gaseous phase in the arid soils of SNL/NM (SNL/NM 1992e). TCE may biodegrade to other chlorinated VOCs, although the process does not occur to any significant extent in surface soil (ATSDR 1988). In the absence of biodegradation or volatilization, TCE may be relatively persistent in the environment.

The potential COCs at ER Site 186 pose no direct human exposure risk. Presently, the combination of institutional controls and partial site cover prevents occupational or public exposure to the potential

COCs. Access to the site is partially controlled by the guards at the KAFB gates and by warning signs posted at the site that forbid digging or disturbing the soil. The release area is covered by concrete or landscape gravel, which should prevent direct exposure to the source. Continued maintenance of the cover will ensure that human exposure and infiltration of precipitation are minimized. If site maintenance requires removal of the overlying concrete or gravel, monitoring will be instituted to ensure worker safety.

Corrective measures to be considered for potentially contaminated soils at ER Site 186 include the following:

- Excavation and removal or disposal of soil.
- Excavation and treatment of soil.
- *In situ* treatment.

Exposure to potential COCs could be prevented by immediately implementing institutional controls, such as security fencing, and completely covering the site. If contaminated soil in ER Site 186 is shallow, it can be excavated and removed for off-site treatment at a licensed treatment and/or disposal facility. The vertical extent of TCE in soil is unknown; therefore, the possibility of a removal action at this site cannot be determined. *In situ* treatments such as soil vapor extraction or treatment for TCE and degradation products would be the most probable corrective measures.

Data required to evaluate corrective measures will be collected as described in the Sampling Plan presented below. No additional data are required to evaluate the effectiveness of institutional controls and covers during the RFI/CMS. It is assumed that the data collected in the course of characterizing the nature and extent of the potential release will be sufficient to determine the feasibility of soil vapor extraction or to approve waste for off-site transport and treatment.

5.6.5 Sampling Plan

The investigation proposed in this sampling plan will determine the nature and extent of potential contamination persisting from the TCE release within the current boundary of ER Site 186. As mentioned above, the horizontal and vertical extents of potential TCE-contaminated soils are not defined.

General DQOs for the TA-I RFI are given in Section 4.3. Site-specific DQOs for ER Site 186 include:

- Determining if TCE or other VOCs (including TCE degradation products) in the gas phase are present in the vicinity of the former T 1-6 at concentrations detectable by an active soil gas survey (Level I).
- Determining if TCE or other VOCs (including TCE degradation products) are present in the vicinity of former T 1-6 by conducting surface and shallow subsurface soil sampling (Level II and III).
- Characterizing the vertical and horizontal extent of potentially contaminated soil by collecting analytical samples from deep boreholes (Level II and III).

These DQOs will be achieved by analyzing soil gas and soil samples collected using the strategy described below. Data will be collected during Geoprobe soil gas sampling, Geoprobe surface and shallow subsurface soil sampling, and deep borehole investigations. If contaminants are detected in the soil gas or soil samples at any concentrations, additional samples will be collected. Analytical Levels I, II, and III will be required for analytical procedures under this plan.

5.6.5.1 Geoprobe Shallow Subsurface Soil Gas Sampling

5.6.5.1.1. Data Collection

The Geoprobe will be used for reconnaissance to collect shallow subsurface soil gas samples (herein referred to as Geoprobe soil gas sampling) from 20 locations surrounding the existing structures where the release was reportedly located (Figure 5-22). The Geoprobe will be used to collect active soil gas samples from 10 ft and 20 ft bgs at each location.

5.6.5.1.2. Analytical Parameters

Table 5-18 at the end of this subsection lists the sampling and analysis requirements for the Geoprobe soil gas samples collected at this site. Field headspace analysis will be conducted on both samples collected at each location. To maximize the chance of detecting TCE, the FID used for the field headspace analysis will be calibrated to TCE, or to a calibration gas with a response factor similar to that of TCE. Depending on availability, a portable field GC unit such as a Photovac 10S may be

J:\dgn\sondia\son026.dgn 110394

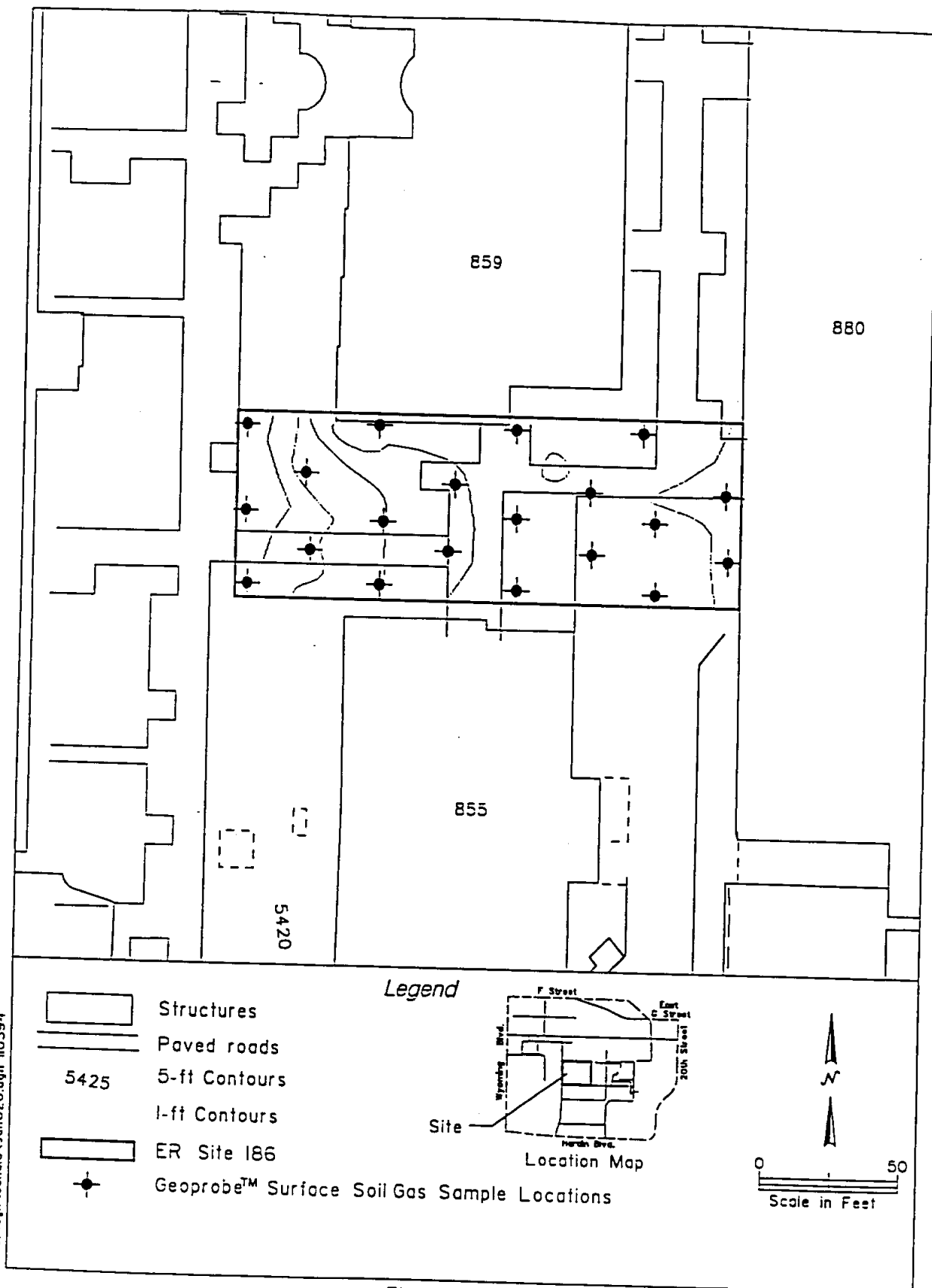


Figure 5-22
ER Site 186: Proposed Sampling Locations

used in place of the FID. With the ability to perform a column separation, the GC is more reliable and has lower detection limits than the FID. The FID analytical results will be compared to the on-site laboratory analysis as a QA check. The VOC samples collected from each borehole will be analyzed by GC/MS at an on-site laboratory (Level II). Split samples of at least 20 percent of the on-site laboratory analyses will go to an off-site contract laboratory for confirmatory analysis (Level III). Table 5-19 lists the analytical parameters, EPA analytical method, analytical level, sample type, sample collection method, sample container, preservative and number of environmental and QA/QC samples.

5.6.5.2 *Geoprobe Surface and Shallow Subsurface Soil Sampling*

5.6.5.2.1 Data Collection

The Geoprobe surface and shallow subsurface soil sampling (herein referred to as Geoprobe soil sampling) will be performed at the five Geoprobe soil gas sampling locations with the highest concentrations of VOCs. If there are fewer than five locations with detectable VOC concentrations, up to five locations will randomly be chosen. Samples will be collected at interval depths of 0 to 2 ft, 3 to 5 ft, 8 to 10 ft, and so on, using the hydraulic-driven probe. The surface soil samples will be collected at 0 to 2 ft deep in unpaved areas, or at the interval immediately below pavement and sub-base materials. For example, if the pavement and sub-base materials extend to a depth of 1.5 ft, the surface soil sample will be collected from a depth of 1.5 to 3.0 ft.

The Geoprobe soil sampler will be advanced until two samples are determined to be clean by means of field screening. Samples will be collected every 5 ft for lithologic logging, field screening (Level I), and laboratory analysis (Level II and III). Initially, the Geoprobe soil sampler will be advanced to 20 ft bgs with split samples collected at 2, 5, 10, 15, and 20 ft. One split from each depth will be sealed, labeled, and held for possible confirmatory laboratory analysis. The other split will be field screened for VOCs as described below. Geoprobe soil sampling will continue until two 5-ft depth intervals have negative field screening results, or to the maximum depth capable with the equipment. In this case three samples/location will be sent for laboratory analysis: one sample from the depth showing the greatest field screening results (to characterize the nature of the COCs), and one sample from each of the two deepest clean sample intervals (to characterize the vertical extent of COCs). If no VOCs are detected by the field screening, then the 15-ft and 20-ft samples will be

considered clean and sent for confirmatory laboratory analysis. No further drilling or sampling would be required at these locations.

Surface and shallow subsurface soil sampling by hand auger or hand-held power auger may be used to compliment the Geoprobe soil sampling. This sampling may be easier at some of the locations, or may necessary in locations that are inaccessible to the Geoprobe rig. At these locations, samples will be collected with a scoop or hand auger at the same depth intervals (to the extent practical) and analyzed for the same parameters as the Geoprobe soil samples.

5.6.5.2.2. Analytical Parameters

Table 5-18 at the end of this subsection lists the sampling and analysis requirements for the Geoprobe soil samples collected at this site. Field headspace analysis will be conducted on the samples collected at the surface and subsequent 5-ft intervals. To maximize the chance of detecting TCE, the FID used for the field headspace analysis will be calibrated to TCE, or to a calibration gas with a response factor similar to that of TCE. Depending on availability, a small field GC unit may be used in place of the FID. All samples with a positive field headspace result will be sent for on-site laboratory TCL VOC analysis. If no hits are detected in the field, the two or three samples collected at each Geoprobe location (minimum of 10 samples) will be analyzed for TCL VOCs. The VOC samples collected from each borehole will be analyzed by GC/MS at an on-site laboratory (Level II). Split samples of at least 20 percent of the on-site laboratory analyses will go to an off-site contract laboratory for confirmatory analysis (Level III).

5.6.5.3 Borehole Investigation

5.6.5.3.1. Data Collection

Locations showing contamination ("hot spots") at the deepest sample interval collected during Geoprobe sampling will require a deep borehole investigation. At those Geoprobe locations where screening and verification sampling do not detect potential COCs, boreholes will not be drilled. Boreholes will be located in groups of up to four and will be clustered around each hot spot location requiring vertical characterization. One borehole will be placed at the Geoprobe soil sampling hot spot location with sampling starting below the deepest sample interval (most likely 30 ft bgs, based on

equipment capabilities). The other boreholes (up to three) will be equally spaced around the central borehole in order to determine the vertical and horizontal extent of any contamination. The number of perimeter boreholes and the distance from these boreholes to the central borehole will be based on the concentration of the contaminant and the depth of contamination identified in the central borehole, as well as site clearance/access issues. If multiple adjacent Geoprobe soil sampling locations identify hot spots in the deepest sample interval, surrounding each Geoprobe sampling location with boreholes may be inefficient. In this case, the deep borehole locations may be optimized to characterize the entire group of Geoprobe soil sampling locations.

The deep boreholes will be drilled with a hollow-stem auger until two consecutive samples are determined to be clean by means of field screening. Samples will be collected at 5-ft intervals to 50 ft bgs, 10-ft intervals to 100 ft bgs, and 20-ft intervals thereafter for lithologic logging, field screening (Level I), and possibly for laboratory analysis. Initially, the borehole will be sampled 5 ft below the deepest Geoprobe sample with split samples collected at two consecutive 5-ft intervals. One split from each depth will be sealed, labeled, and held for possible laboratory analysis. The other split will be screened for VOCs (described below) to determine the presence of VOCs. If no VOCs are detected by the field screening, then these two 5-ft samples will be considered clean and sent for confirmatory laboratory analysis.

If VOCs are detected in either of the two consecutive 5-ft samples by field screening, then the borehole will continue to be advanced and split samples will be collected at appropriate intervals. Borehole soil sampling will continue until two consecutive depth intervals have negative field screening results, or to the depth limits of the drilling methods. In this case three samples/location will be sent for laboratory analysis: one sample from the depth showing the greatest field screening results (to characterize the nature of the COCs), and one sample from each of the two deepest clean sample intervals (to characterize the vertical extent of COCs).

Because the TCE release volume is calculated to be potentially large, it is assumed that the Geoprobe soil sampling will not fully characterize the vertical extent of contamination. For planning purposes, it is assumed that the boreholes will be a maximum of 100 ft deep. It is assumed that to characterize the vertical extent of contamination, approximately 400 ft of borehole will be needed. This drilling footage is based on the estimation that one cluster of four boreholes (each drilled to 100 ft bgs) may be needed. If these assumptions appear to be erroneous as the investigation proceeds, additional

boreholes may be drilled. Sampling in any additional boreholes would be similar to that described below.

5.6.5.3.2. Analytical Parameters

As many as 12 off-site laboratory analytical samples (from up to 4 boreholes, with 3 samples from each) are proposed for the deep boreholes. Table 5-18 at the end of this subsection lists the sampling and analysis requirements for the samples collected at this site. Field headspace analysis will be conducted on all samples collected. To maximize the chance of detecting TCE, the FID for the field headspace analysis will be calibrated to TCE, or to a calibration gas with a response factor similar to that of TCE. Depending on availability, a small field GC unit may be used in place of the FID. All samples with a positive field headspace result will be sent for on-site laboratory VOC analysis. The VOC samples collected from each borehole will be analyzed by GC/MS at an on-site laboratory (Level II). Split samples of at least 20 percent of the on-site laboratory analyses will go to an off-site contract laboratory for confirmatory analysis (Level III).

October 13, 2003

ADDITIONAL /SUPPORTING DATA

**CAN BE VIEWED AT THE
ENVIRONMENTAL, SAFETY, HEALTH
AND SECURITY (ES&H and Security)
RECORD CENTER**

**FOR ASSISTANCE CALL
844-4688**